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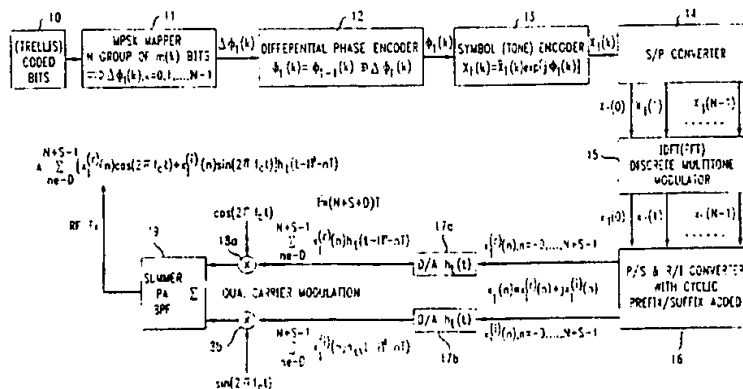
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(54) An FFT-based multitone DPSK modem

(57) A system and a method for transmitting coded information bits using multitone techniques on a frame-by-frame basis. For transmission, coded information bits are mapped into differential phase signals and absolute phase signals are generated based on differential phase signals. N complex symbols are then generated and inverse discrete Fourier transformed into N complex, time-domain samples, which are augmented with a cyclic prefix and suffix. The augmented N complex, time-domain samples are then separated into two real samples and converted into first and second baseband signals. The first and second baseband signals are impressed into quadrature carrier components to form in-phase and quadrature signal components which

are combined into an RF signal prior to transmission. For reception, a received RF signal is non-coherently quadrature demodulated into first and second quadrature baseband signals. First and second quadrature sample sequences are generated by sampling the quadrature baseband signals in parallel. The added cyclic prefix and suffix are discarded, and N complex numbers are generated from the first and second quadrature (real) sample sequences. N channel-weighted tones are generated by performing a discrete Fourier transform on the N complex numbers. N phase difference signals are generated which are demapped into coded information bits according to a predetermined phase constellation.

FIG. 1





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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	SAITO M ET AL: "TRANSMISSION CHARACTERISTICS OF DQPSK-OFDM FOR TERRESTRIAL DIGITAL BROADCASTING SYSTEMS" IEICE TRANSACTIONS ON COMMUNICATIONS,JP,INSTITUTE OF ELECTRONICS INFORMATION AND COMM. ENG. TOKYO, vol. E77-B, no. 12, page 1451-1460 XP000498059 ISSN: 0916-8516 * abstract * * page 1451 - page 1453, Section 2 ; figure 3 *	1-34	H04L27/26
X	ENGELS V ET AL: "OFDM-UBERTRAGUNGSVERFAHREN FUR DEN DIGITALEN FERNSEHRUNDUNK" RUNDFUNKTECHNISCHE MITTEILUNGEN,DE,MENSING. NORDERSTEDT, vol. 37, no. 6, page 260-270 XP000425954 ISSN: 0035-9890 * abstract * * page 261 - page 264, Section 2 ; figures 1,3 * * page 265, Section 3.2 *	1-34	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04L
X	BINGHAM J A C: "MULTICARRIER MODULATION FOR DATA TRANSMISSION: AN IDEA WHOSE TIME HAS COME" IEEE COMMUNICATIONS MAGAZINE,US,IEEE SERVICE CENTER. PISCATAWAY, N.J., vol. 28, no. 5, page 5-8,11-14 XP000132491 ISSN: 0163-6804 * page 12, right-hand column, paragraph 1 - paragraph 5 * * page 13, left-hand column, paragraph 2; figure 7 *	1-34	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 November 1999	Examiner Koukourlis, S
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EUROPEAN SEARCH REPORT

Application Number
EP 97 30 6231

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 5 416 801 A (BRAJAL AMERICO ET AL) 16 May 1995 (1995-05-16) * column 3, line 43 - column 4, line 58 * * column 5, line 59 - column 12, line 61 * ---	1-34	
A	EP 0 719 004 A (MATSUSHITA ELECTRIC IND CO LTD) 26 June 1996 (1996-06-26) * column 10, line 13 - line 34; figure 3 * ---	6-8, 23-25	
A	EP 0 722 235 A (MATSUSHITA ELECTRIC IND CO LTD) 17 July 1996 (1996-07-17) * column 17, line 54 - column 18, line 7 * ---	1,10,14, 18	
A	US 4 179 586 A (MATHEWS MITFORD M JR ET AL) 18 December 1979 (1979-12-18) * column 7, line 18 - line 27 * -----	13,17, 30,34	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
Place of search THE HAGUE		Date of completion of the search 16 November 1999	Examiner Koukourlis, S
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ON EUROPEAN PATENT APPLICATION NO.**

EP 97 30 6231

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The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5416801	A	16-05-1995	DE 69322322 D	14-01-1999
			DE 69322322 T	17-06-1999
			EP 0578313 A	12-01-1994
			JP 6164534 A	10-06-1994

EP 0719004	A	26-06-1996	JP 8321820 A	03-12-1996
			US 5682376 A	28-10-1997

EP 0722235	A	17-07-1996	CA 2166599 A	11-07-1996
			JP 8251135 A	27-09-1996
			US 5774450 A	30-06-1998

US 4179586	A	18-12-1979	NONE	

EPO FORM P0459

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